Provision of an electronic library at the clinical frontline: evaluation of impact on hospital medical staff

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Doctors need convenient access to the latest information if they are to meet the demands of clinical governance and evidence-based medicine. Forest Healthcare NHS Trust used its intranet to provide clinical areas with direct 24-hour access to library materials.

INTRODUCTION

The emphasis placed by the Department of Health on evidence-based practice and clinical governance (Department of Health, 1997) places a requirement on doctors to review clinical practice continually. It is important that doctors have ready access to up-to-date research findings and reviews. Ideally, resources to support evidence-based medicine (EBM) would be available at the bedside at all hours of the day and night, 7 days a week. Traditional hospital library provision, augmented by textbooks and journals within clinical departments, no longer suffice. Ways of providing continuously available, easily accessible, up to the minute information need to be found.

One response to this need is the provision of an intranet linked to clinical areas, providing electronic access to the latest information relevant to clinical practice. This paper describes such a system, and outlines successes and challenges arising from its implementation.

THE INTRANET PROJECT

Following a pilot front-line EBM project in the North Thames region (Cumbers and Donald, 1998), Forest Healthcare NHS Trust was proactive in using the local intranet with terminals in clinical areas. This provides 24-hour access to library materials, including bibliographic databases (e.g. Medline and CINAHL), the Cochrane library, and a range of electronic text 'books'. The first seven departments to be connected to the intranet, in May 1999, were accident and emergency, anaesthetics, general medicine, maternity, orthopaedics, paediatrics and surgery. Terminals were located on wards and in departmental offices or seminar rooms. For simplicity, speed of implementation and economy, the original intranet was based upon an existing NT network and a CDNet server. There was rapid expansion of the intranet across the hospital, and there is an ongoing programme of upgrades, evaluation and improvements to the service.

As each department was connected to the intranet, training was made available during their protected teaching time. This took the form of a demonstration of the resources available using the departmental terminal, presented by an experienced librarian. Individual advice was also given and doctors were encouraged to try out the new resources, contacting the library if they required further assistance. In addition, the librarian advertised the availability and scope of the online resources in clinical areas at the regular induction meetings for rotating junior doctors.

EVALUATION

An evaluation of doctors' responses to the provision of online library materials was undertaken (Freeth, 2000). Questionnaires were completed by 110 doctors after their introduction to the online resources (stage 1). Approximately 12 weeks later, a second visit was made to each department (stage 2) and follow-up questionnaires were distributed to explore:

- Changes in the use of online materials
- Perceptions of the strengths and weaknesses of online resources in clinical areas
- Changes in practice resulting from the use of online materials.

Stage 2 questionnaires were completed by 73 doctors. It proved possible to match 59 pairs of questionnaires where the same individuals had responded at both stages.

Responses to closed questions were processed using the statistical package SPSS. Frequencies and cross-tabulations were investigated. Statistical tests applied to the paired data included the Student's *t*-test, large sample tests for the difference between proportions and, where appropriate, the non-parametric Mann–Whitney test. A total of 773 comments made in response to the open questions were coded, then grouped into themes. Fifty additional comments were treated similarly.

RESULTS

Doctors were very enthusiastic about the provision of intranet terminals within their departments, anticipating that this would be a convenient way to access up-to-date information that would assist clinical decision-making. They anticipated that the online resources would be most useful outside normal library hours.

At stage 1 of the evaluation (the introductory demonstration) 25% of doctors had already made use of the departmental terminals, often as a result of encouragement from senior colleagues. Within the paired data, the proportion of doctors using their department's terminal had risen to 41% by stage 2. Weekday afternoons and weekday evenings were the most popular times for accessing online library materials. Demand during

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weekends was lower, with only 19% of doctors logging on.

The resources most often accessed were bibliographic databases (usually Medline) and online texts relevant to the doctor's area of practice, such as *Nelson's Textbook of Paediatrics* (Behrman et al, 1997) or *Anaesthesia* (Miller, 1996). Use of the Cochrane library was infrequent with only around 20% of doctors accessing this resource. Some departments also arranged Internet access. A number of doctors expressed concern about assessing the reliability of information found on the Internet.

Reservations about the provision of online library resources within clinical areas included lack of time to access them and the potential for interruptions to occur mid-search. There were initial concerns about competition for the departmental intranet terminal, but in fact this rarely proved to be a problem. Many doctors expressed a lack of confidence in their information technology (IT) and information management skills, from logging on to efficient searching and critical appraisal of search results.

To comply with NHS information policies, access to the intranet required regularly changed and relatively complicated passwords. Doctors found this frustrating, particularly if they were occasional users of the online materials and found themselves 'locked out' because of a forgotten or expired password. Other frustrations concerned an inability to provide suitable online texts for some specialities, and technical problems with one or two terminals after first installation. Overall, there was a high level of satisfaction with the hardware and software selected for this project. The most common request for improvement was the provision of more full-text materials.

The evaluation probed the ways in which online materials are used by doctors to support their professional practice. The responses of the 73 doctors contributing to stage 2 are summarized in *Table 1*. A small number of doctors reported accessing online resources to support other professional activities — for example, medicolegal work.

At stage 2, ten respondents (16%) identified 11 examples of changed practice that they considered resulted from the ability to consult online materials in the clinical area, while 19 respondents (31%) considered there were none so far. There were more instances of changed practice reported in maternity than in other departments. It may be significant that this department was the first to be equipped with access to research databases from their ward area.

Respondents were asked to indicate the level of their agreement with a series of 26 statements using a five-point Likert scale. *Table 2* summarizes responses to the 13 statements most concerned with doctors' use of the intranet and the information they found. It shows the proportion of doctors that replied 'agree' or 'strongly agree'. Finding time to access online materials and to develop IT and searching skills was a frequently reported problem. However, the need to do this was almost universally rec-

TABLE 1.
Doctors' use of online materials to support their professional practice

Reason for use	Percentage
To review the management of patients	62
To plan the management of rare cases	60
Preparation for teaching*	59
To check things he/she is unsure of	58
To inform one's own research or that of the team	56
Preparation for examinations†	49

*n=56 after removing preregistration house officers; †n=53 after removing those no longer studying for exams

TABLE 2.
Levels of agreement with statements relating to intranet resources

	Stage 1 (n=110)	Stage 2 (n=73)	Significance†
I don't need to access information from a computer	1%	0%	NS
I would like to access computer databases, but don't really know how to	44%	23%	**
I have used the computer databases successfully	42%	58%	*
I prefer handling real books/journals to accessing information on a computer	32%	37%	NS
It takes too long to find the information I want on the computer	31%	18%	*
I can quickly use the department's terminal between other tasks	15%	16%	NS
Using the department's terminal, I get interrupted too often	15%	8%	NS
I keep meaning to look things up on the computer, but never find the time	51%	55%	NS
I can't apply much information from computer searches to my daily work	16%	19%	NS
Information gained online influences my subsequent practice	45%	41%	NS
I share with colleagues things I've found online	50%	52%	NS
I need to develop my skills in accessing information online	87%	66%	**
I want more training for accessing information online	84%	59%	**

† Statistical significance of the difference between proportions (two-tailed): * significant at 5% level; ** significant at 1% level

ognized and roughly half the doctors surveyed tried to share new knowledge with colleagues.

The significant results in *Table 2* show that by stage 2, when departmental terminals, training and individual trouble-shooting had been available for about 3 months, doctors were making more use of online resources. Their IT and information handling skills had improved, e.g. they were accessing relevant information more quickly. Nevertheless, the majority wanted to improve their skills further.

DISCUSSION

As is often the pattern for innovations, this initiative was driven forward by a small number of key individuals — in this case, most notably by the commitment and enthusiasm of a senior physician and a senior librarian. They developed new skills and knowledge in relation to provision of online materials via an intranet, and negotiated with clinical teams, managers and IT staff. The project also benefited from the support of enthusiastic consultants in a range of departments, and the experience of a CD-ROM-based pilot in one department (Littler and Weist, 1998).

The inhibiting effect of complicated* and regularly changing passwords, particularly for irregular users, has to be taken seriously. Professional updating and the implementation of EBM may be jeopardized. The aim of continuous, immediate access to the latest information to support clinical decisions may be thwarted. Decisions have to be made about appropriate levels of electronic security on this type of intranet. 'Firewalls' or electronic security barriers can used to protect more sensitive information if access to EBM resources is made easier.

The low usage of the Cochrane library was not unexpected, but still disappointing. The full-text Cochrane reviews, the appraised reviews database and the controlled clinical trials database render it a most useful resource when looking for both systematic reviews and controlled trials that test therapeutic efficacy. It is recognized that it is not straightforward to apply findings from the restricted conditions of systematic reviews or clinical trials to the diversity of everyday practice. However, part of the tendency not to access this resource seems to have been linked to a lack of awareness of its availability and scope, and doctors' lack of confidence in their searching and critical appraisal skills. Therefore, an investment in further awareness raising and training in relation to the Cochrane library is underway as part of the newly created role of clinical support librarian (Watson and Weist, 2000).

A minority of doctors do not access any online materials. Their reticence centres upon:

- Lack of confidence with IT or in their electronic search skills
- Pessimism about finding anything useful
- A preference for paper-based resources.

It is almost inevitable that online materials will gradually replace paper-based resources. A dearth of paper-based resources may provide sufficient motivation for those who have not yet acquired a functional knowledge of the use of online materials to do so. However, some doctors will need training or trouble-shooting support to help them make this transition.

CONCLUSIONS

The intranet has been well received. Most doctors have been keen to make use of the online materials, although some have needed assistance to achieve this. Changes in clinical practice have resulted from the ready availability of research evidence from clinical areas.

This innovation could be successfully replicated in a variety of clinical environments, provided there are willing staff to champion the initiative. To be valued and used, the service provided needs to be reliable, swift, focused on clinicians' needs, and supported by timely training or individual assistance. Simply providing the infrastructure is not sufficient.

It should be recognized that this innovation points towards changed ways of working for both doctors and librarians. Expressions of resistance to change were anticipated, and some occured. However, our experience was that most people relished the opportunities for personal and career development offered by the intranet project. HM

Conflict of interest: none.

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KEY POINTS

- Doctors are keen to make use of online materials to enhance their professional practice.
- Help and advice needs to be readily available for those struggling to make the best use of online resources; simply installing the technology is not sufficient.
- A demand for training in search strategies and critical appraisal skills will be generated.
- Doctors need to be reminded of the availability and scope of the less familiar resources, e.g. the Cochrane library.
- Changes in clinical practice can result from the provision of ready access to research evidence.
- Enthusiastic change agents, with appropriate expertise, are necessary to launch and sustain this type of initiative.
- The online service needs to be user-friendly and reliable.

*Six characters in length including a number and an upper-case symbol.